

REMARKS

Claims 1-20 remain pending in the application with the present amendments. Claims 1 and 17 are amended herein to correct the informalities noted therein by the Examiner. Claims 1, 17 and 19 are also amended to distinguish them from the art cited by the Examiner. In the Office Action, the Examiner rejected all claims as being anticipated by U.S. Patent No. 6,426,254 to Kudelka et al. ("*Kudelka*"). For the reasons set forth below, applicants respectfully submit that the presently pending claims are fully distinguished from *Kudelka*.

As amended herein, the claims recite methods in which a buried plate region is formed in a semiconductor substrate. As recited in the independent claims 1, 17 and 19, a liner is formed along a lower portion of a sidewall of a trench in the substrate. The liner recited in the pending claims is formed at a different time and serves a different purpose from the liner described in *Kudelka*. The liner addresses a problem described in the background of the application as prior art. That is, the liner functions as a diffusion barrier to inhibit diffusion of the dopant and oxygen into the substrate when the dopant source layer is being formed. The liner does so without hindering formation of the buried plate, as it permits the dopant to be driven through the liner into the semiconductor substrate during the later step or annealing.

The pending claims are clear that the recited order of processing is to form the liner along the trench sidewall and *thereafter* form the dopant source layer *overlying* the liner. Annealing is then performed to drive the dopant from the dopant source layer *through the liner* into the semiconductor substrate *to form the buried plate*. Thus, as recited in the pending claims, the step of forming the dopant source layer is performed

after the step of forming the liner. Also, the step of forming the buried plate is performed after the step of forming the liner and the dopant source layer.

By contrast, in the methods recited in *Kudelka*, the dopant source layer and/or the buried plate are formed before the liner is formed, opposite the order which is recited in pending claims 1, 17 and 19. (See FIGS. 3-4 and accompanying description at col. 4, lns. 48-64). The liner described in *Kudelka* is not present when the dopant source layer is formed and, therefore, has no function of inhibiting diffusion into the substrate at that time. Rather, the liner described in *Kudelka* is instead used to protect the lower portion of the trench during the subsequent process of forming the collar in the upper portion of the trench.

In the embodiment described relative to FIGS. 9-12 of *Kudelka*, the liner serves the same function of protecting the lower portion of the trench when the collar is formed in the upper portion of the trench. However, in such embodiment, the buried plate is formed after the collar, by gas phase doping. Here again, the liner described in *Kudelka* is not present during formation of a dopant source layer and, therefore, has no function of inhibiting diffusion into the substrate at such time. In fact, in that embodiment, *Kudelka* does not teach use of a dopant source layer, only gas phase doping.

In the embodiment described in *Kudelka* relative to FIGS. 5-6, the dopant source layer 105 is first formed along the sidewall of the trench and then the liner 107 is formed to overlie the dopant source layer 105. In such case, clearly the dopant from the dopant source layer does not diffuse *through the liner* into the semiconductor substrate as recited in the claims, since the dopant source layer is next to the semiconductor substrate and the liner overlies the dopant source layer.

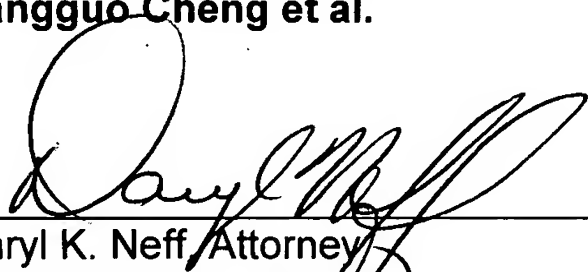
Support for the present amendments is provided, *inter alia* at paragraphs [0018] to [0020].

Accordingly, in view of the amendments and remarks herein, it is believed that all claims of the application are now in condition for allowance. However, if for any reason the Examiner does not believe that such action can be taken at this time, the Examiner is requested to telephone the Applicants' attorney at the number indicated below to discuss any issues that may remain.

It is believed that no fee is due in connection with the filing of this Amendment. However, if any fee is due, authorization is granted to debit the Deposit Account No. 09-0458 of the Assignee. If there is an overpayment, please credit the same account.

Respectfully submitted,
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